tution, Washington, D.C., is one of a long series of new plants discovered on Dr. Smith's fruitful collecting trip to Santa Catarina in 1956–57.

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STUDIES IN WESTERN VIOLETS, IX. MISCELLANEOUS SPECIES IN THE SECTIONS NOMIMIUM AND CHAMAEMELANIUM

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This paper treats four taxa of *Viola* in the sections *Nomimium* and *Chamaemelanium*—a newly described species, a change of status from species to subspecies for a second taxon, observations confirming the specific status of a third taxon, and a newly described subspecies. In addition to my own specimens at the North Coast Herbarium, I have cited specimens from the United States National Herbarium, the New York Botanical Garden, the California Academy of Sciences, and the University of California Herbarium; to the curators of these latter herbaria I express my appreciation.

Viola Aliceae sp. nov. Herba exigua omnino puberulenta cauli supraterrano brevissimo suppressoque et rosella basali foliorum ac floribus uno duobusque folias parum excedentibus instructa cauli subterreno gracili bracteas squamas simulantes gerente, tota ex radice fusiformi longitudine variabili (ut apud specimina typica videtur) crescens; folia oblongo-ovata vel elliptica obscure undulato-dentata decurrentia 2 vel 3 cm. longa dimidio lata petiolis laminas longitudine aequantibus; stipulae inconspicuae lanceolatae marginis laceratis; flores caesii longitudine 1 cm. parum excedentes petalis angustis eis lateralibus aliquantulo barbatis; stigma ut id *Violae aduncae* ebarbatum; et capsula et semina hucusque ignoti.

A small plant, 5 to 11 cm. high, caulescent but the aerial stem undeveloped, bearing a rosette of leaves and one or two flowers slightly above the leaves; finely puberulent throughout; subterranean stem slender with scale-like bracts; taproot variable in length (as in type sheet); leaves long-ovate to elliptic, obscurely undulate-dentate, decurrent, 2 to 3 cm. long and half as wide, on petioles about as long; stipules inconspicuous, lanceolate with lacerate margins; flowers lavender, slightly more than 1 cm. long; petals narrow, the lateral slightly bearded; stigma like that of *Viola adunca* but without beards; capsule and seeds unknown. Figs. 1, 2.

Type. Mexico. Near kilometer 34 post on Mexico City–Cuernavaca highway, altitude 9000 feet, *A. Y.* and *J. E. Wilcox* in 1948 (UC 1,200,-778). Topotype. *A. Y.* and *J. E. Wilcox 22,* 1946. *Viola Aliceae* should be

assigned to Section *Nomimium* Ging., although the stigma and style are somewhat different from other members of this section.

When making their second collection of the violet in 1948, the one cited above as the type, Mr. and Mrs. Wilcox dug deeply to investigate the character of the root system. In 1952 they returned to the type locality, but a diligent search of several hours failed to reveal any plants of this violet.

In some cases the underground stem measures only a few centimeters, and could represent the normal growth from a seed over a few years, such as the upper right hand plant (topotype, *Wilcox 22*) on the type sheet. In other cases the vertical subterranean stem is very slender and possesses a number of scale-like bracts at more-or-less regular distances apart, such as the plant on the upper-left-hand side of the type sheet (type collection, *Wilcox* in 1948). How such a stem was formed is not clear. It might be formed by underground stolons from another plant such as that represented by the topotype. However, I do not know of such a case in any other species of *Viola*.

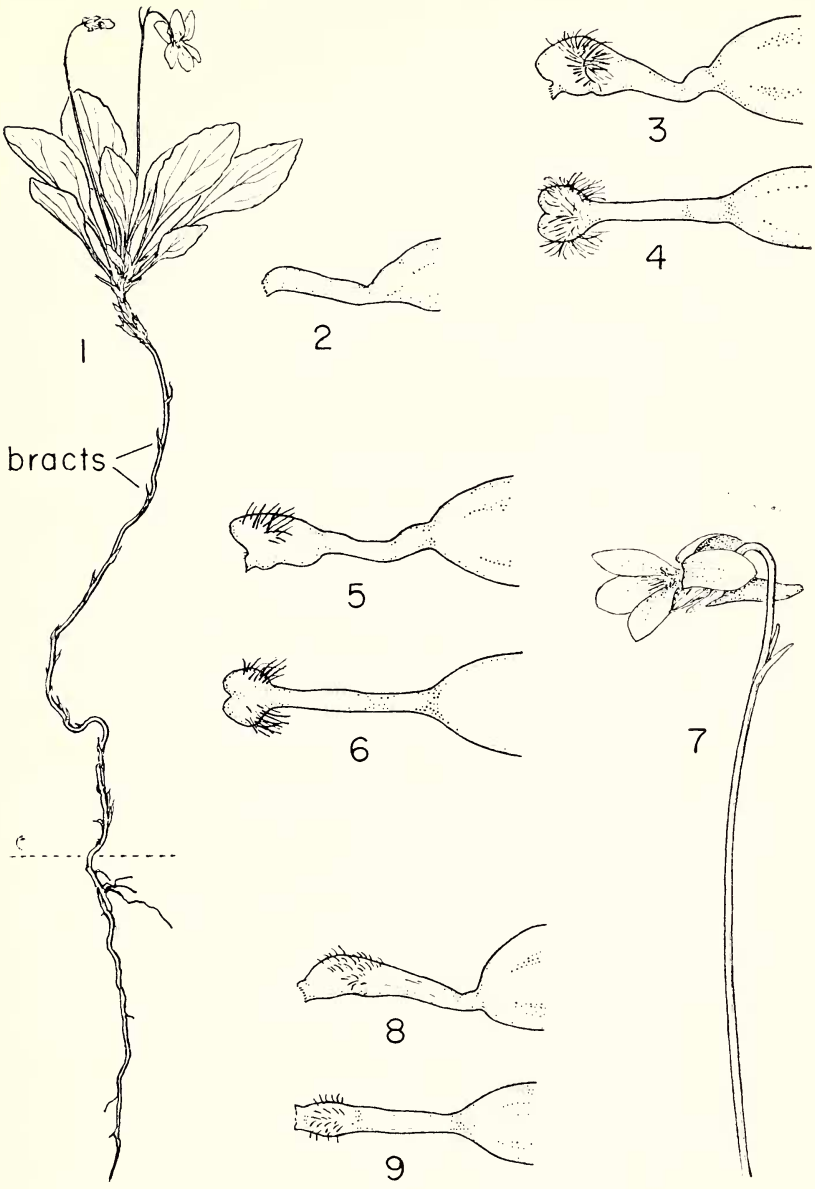
Two other collections of *Viola* resemble *V. Aliceae* in having similar slender underground stems as well as similar style and stigma, but they differ from that species in being wholly glabrous [Quebrada Honda, Durango, *Palmer 227* (US, NY); Sierra Madre near Chihuahua, *Townsend & Barber 94* (US, NY)]. Their exact relationship to *V. Aliceae* cannot be determined at this time. Some of the plants on the Palmer sheet, however, represent another species unrelated to *V. Aliceae*.

Viola lobata Benth. subsp. **psychodes** stat. nov. *V. psychodes* Greene, Pittonia 3:318. 1898.

In 1898, E. L. Greene proposed the name *V. psychodes* for a violet collected near Waldo, Oregon. Since then, this taxon has been collected at many locations in California. In general *V. psychodes* resembles *V. lobata*, which is abundant in California. The differences between these two taxa do not seem of sufficient magnitude to merit retention of both of them as species; therefore I propose treating *V. psychodes* as a subspecies of the common *V. lobata* Benth, section *Chamaemelanium* Ging. Both have similar root systems, a naked stem with leaves and flowers borne near the summit, leaves that may be variously lobed or even entire, and similar pistils (figs. 3–6). Plants of both taxa have the habit of producing a single radical leaf for the first year.

There are, however, some differences between the two, the most significant being that subsp. *psychodes* is glaucous throughout, while *V. lobata* is puberulent. Another difference is leaf thickness—the average for *V. lobata* is 0.0036 inch, while for subsp. *psychodes* it is 0.0057 inch. The measurements for these averages were obtained from leaves of ten collections of each taxon, using a Starrett micrometer which is accurate to one ten thousandths of an inch.

It may be of interest to note that several of the collections of subsp.



FIGS. 1–9. *Viola*. FIGS. 1, 2, *V. Aliceae: 1,* habit, × ¾; *2,* pistil, side view. FIGS. 3, 4, *V. lobata* subsp. *lobata*: *3,* pistil, side view; *4,* pistil, dorsal view. FIGS. 5, 6, *V. lobata* subsp. *psychodes*: *5,* pistil, side view; *6,* pistil, dorsal view. FIGS. 7, 8, 9, *V. oxyceras*: 7, flower, × 1½; 8, pistil, side view; *9,* pistil, dorsal view. All pistil illustrations × 9.

psychodes were made in serpentine areas, but I have not been able to ascertain whether or not the plant is restricted to serpentine soil.

Representative specimens. OREGON. Josephine County: Little Rock Creek, 2 miles southwest of O'Brien, *Constance & Rollins 2995* (NCH, UC); open woods near Waldo, Oregon, April 20, 1887, *Howell* (UC); near Kirby, *Baker 5526* (NCH). CALIFORNIA. Hearst Castle [Sacramento Canyon], July 22, 1902, *Setchell & Dobie* (UC); serpentine on west side of Sacramento River Canyon, *Wagnon 1616* (NCH). Butte County: east of Oroville, west of Brush Creek Ranger Station, *Cantelow* 4527 (CAS). Del Norte County: on serpentire, Gasquet, *Baker 211* (NCH), *Baker 285* (NCH); near Gasquet, *Tracy 10011* (UC); headwaters Shelly Creek, Oregon Mountain, *Hoffman* (NCH). Plumas County: Highway 39 east of summit near Mineral, *Baker 8104* (NCH). Shasta County: Delta, *Applegate 5396* (NCH); Castella, June 19, 1923, *Bethel* (CAS); Castle Rock, *Ripley & Barneby 9642* (CAS); on serpentine, Dunsmuir, *Baker 8050* (CAS, UC), *Hall & Babcock 4031* (UC), *Heller 7927* (UC); on serpentine, Shasta Retreat, July 4, 1911, *Condit* (UC); Mount Eddy (some genes of *V. lobata* Benth.), June 1, 1946, *Parker* (UC). Siskiyou County: Rainbow Ridge above Sulloway Creek, about 1½ miles west of Mount Shasta City, June 13, 1936, *Babcock & Stebbins 2000* (UC); near Mount Shasta City, *Baker 5525* (NCH); serpentine on east slope Scott Mountain, *Hoffman 2434* (NCH); 6½ miles north of West Brand Road, Happy Camp, *Hoffman 2572* (NCH); trail 1 mile west of Lookout, Clear Creek, *Hoffman 3514* (NCH). Trinity County: near Granite Peak, *Baker 205* (NCH); Minersville to Trinity Center, *Eastwood & Howell 4912* (CAS); between Baylers and Trinity Center, *Hoffman 2420* (NCH); Trinity Alps Resort, *Cantelow 995* (CAS); North Fork Mountain, 3500 feet, *Hoffman 3504* (NCH); near boundary of Trinity and Siskiyou counties, Scott Mountain, *Howell 13618* (CAS); north slope of Scott Mountain, 3700 feet, *Cantelow 1453* (CAS); south slope of Scott Mountain, *Cantelow 1452* (CAS); Scott Mountain Road, 11½ miles north of Carrville, June 9, 1939, *Cantelow* (CAS); Nash Mine near Carrville, June 23, 1931, *Van Dyke* (CAS); 17 miles north of Carrville, May 21, 1936, *Cantelow* (CAS); 3 miles north of Carrville, May 21, 1936, *Cantelow* (CAS).

Viola oxyceras Greene. On the Pacific Coast of North America there are two distinct species of caulescent blue-flowered violets in the section *Nomimium* Ging.: *V. adunca* J. E. Smith, which is found from sea level to a fairly high altitude, and *V. oxyceras* Greene, which grows in the mountains down to about 4000 feet. The latter was considered by Sereno Watson to be only a variety of what we now call *V. adunca* [*V. canina* var. *oxyceras* Wats., Brew. and Wats., Bot. Calif. 1:56. 1876]. This viewpoint may have arisen because in some localities interbreeding between these two species has produced intermediate forms; at most localities, however, the pure types remain distinct.

Aside from their similarity in flower color, the two have little in common. The leaves of *V. adunca* are ovate, more or less subcordate at the base, and have a pointed apex; those of *V. oxyceras* are much thinner, sometimes wider than long, with a cuneate or truncate base (never cordate), and are rounded at the apex. The foliage of *V. adunca* shows some puberulence (except for occasional glabrous races), while that of *V. oxyceras* is without exception entirely glabrous. The form of the flower in these two is different; the flowers of *V. adunca* are larger, having the petals spread in approximately one plane, and having a rather blunt spur; those of *V. oxyceras* are smaller, the upper four petals lie mostly in one

plane, but the lower petal lies below in another plane (fig. 7). The beak of the style in *V. adunca,* although always directed essentially downward, may be pointed forward, or may be at right angles to the axis of the style, or may even assume a still more reflexed position, and it has always a smaller diameter than the head of the style. The beak of *V. oxyceras,* with its stigmatic tube always pointing forward, is very different, having a diameter nearly as large as the head of the style (figs. 8, 9).

The seeds of *V. adunca* and *V. oxyceras* differ also, in both shape and in size. Although the seeds of *V. adunca* vary quite widely in size, they are never as small as the seeds of *V. oxyceras.* But more important than size, the seeds of these two taxa are of different shape. The more rounded seed of *V. oxyceras* is indicated by a length to width ratio of 1.85 to 1, while in the case of *V. adunca* (from six localities) the ratio is 1.98 to 1. With these differences in mind, the maintenance of the two species seems justified.

Representative specimens. CALIFORNIA. High mountain near Donner Pass, 1865, *Torrey 34* (UC), type of *V. canina* var. *oxyceras* Wats. ALPINE COUNTY: Lake Alpine, *Allen 542* (UC); near Lake Alpine, 7,500 feet, *Peirson 11567* (UC). AMADOR COUNTY: Silver Lake, 7,500 feet, *Baker 8557* (NCH). BUTTE COUNTY: Jonesville, 1,500 m., *Copeland 662* (UC); Jonesville, *Copeland 1219* (NCH). EL DORADO COUNTY: Highway 50, 1 mile east of Strawberry, 6,500 feet, *Robbins 1712* (UC); near Lyons Creek about 4 miles south of Wright Lake, 6,700 feet, *Robbins 2020* (CAS, UC), *Robbins 2022* (NCH). FRESNO COUNTY: Vidette Creek, 10,500 feet, 1948, *Dyer* (CAS); Bubb's Creek, at base of East Vidette, 1948, *Chabaud* (CAS); Second Recess, 9,000 feet, *Raven 5697* (CAS). INYO COUNTY: Cottonwood Lakes, 11,000 feet, *Alexander & Kellogg 3417* (UC). TULARE COUNTY: Tyndall Creek, 1916, *Campbell* (CAS). LASSEN COUNTY: Summit Lake, *McCalla 646* (NCH); east fork of King Creek on Cinder Cone Trail, 7,000 feet, *Jepson 4110* (JEPS). MARIPOSA COUNTY: Eagle Peak, Yosemite, 7,200 feet, *Jepson 4372* (JEPS). MODOC COUNTY: High Grade District, northern Warner Mountains, 7,000 feet, *Smith 948* (JEPS). PLACER COUNTY: above Donner Lake, *Copeland 1883* (UC); below Cisco, *Heller 12713* (UC); Summit Valley, *Howell 18577* (CAS). PLUMAS COUNTY: Little Grass Valley, *Baker 9966* (NCH); 1½ miles west of Johnsville, 5,300 feet, *Cantelow 4560* (CAS). SHASTA COUNTY: 22 miles southeast of McCloud, *Cantelow* (NCH). SIERRA COUNTY: Webber Lake, 8,000 feet, *Baker* (NCH). SISKIYOU COUNTY: Marble Mountain, *Chandler 1585* (NCH). TEHAMA COUNTY: near Morgan, 5,500 feet, *Hall & Babcock 4326* (UC). TULARE COUNTY: Camp 170, nine miles north of Mt. Silliman, *Brewer 2807* (UC); South Fork Kaweah River, 8,500 feet, *Ferris & Lorraine 10850* (UC); Center Basin, 11,200 feet, 1948, *Howell 25057* (CAS); Second Lake, Center Basin, 11,400 feet, *Munz 12565* (NCH). TUOLUMNE COUNTY: Kennedy Lake, *Hoover 1458* (UC).

VIOLA BAKERI Greene subsp. **shastensis** subsp. nov. A subspecie *Bakeri* capsulis pubescentibus et paginis sepalorum pilos paucos breves adpressos gerentibus discedit.

This subspecies differs from *V. Bakeri* subsp. *Bakeri* (section *Chamaemelanium* Ging.) in its pubesent capsules and in the presence of a few short appressed hairs on the faces of the sepals.

During the flowering stage, before the appearance of the capsules, subsp. *shastensis* may be distinguished from subsp. *Bakeri* by a careful examination of the sepals. In subsp. *Bakeri,* the faces of the sepals are

entirely glabrous and without any short, appressed hairs such as those found on the faces of the sepals in subsp. *shastensis*. In other respects, as far as I have observed, these taxa are identical.

Type. Postpile Camp, altitude 6000 feet, western Tehama County, California, July 1, 1955, *Baker 13045* (UC 1,199,915); topotype, July 10, 1954, *Baker 12961* (NCH).

Since its discovery in western Tehama County in 1954, *V. Bakeri* subsp. *shastensis* has been found to occur from southern Oregon south in the western slopes of the Sierra Nevada of California to Amador County, as detailed below.

Other collections. OREGON: Road to Dutchman's Peak, May 30, 1938, *Rowntree* (NCH). CALIFORNIA. Trinity County: Scott Mountain, *Cantelow 4576* (CAS), *Baker 13139* (NCH), *Wagnon & Barbe* (NCH). Lassen County: "devastated area" earth slide, Highway 89, north side Mount Lassen, *Baker 11975* (NCH). Amador County: Silver Lake, altitude 7,400 feet, *Wagnon 1620* (NCH).

One may ask, why should such inconspicuous characters justify the creation of a new subspecies? Our reply is that in the subsection *Nuttallianae* Becker, naked capsules have long been regarded as a diagnostic character separating the *V. Nuttallii* species complex from the *V. purpurea* complex. However, recent studies in *V. praemorsa* of the *Nuttallii* complex have shown that two subspecies have some puberulence of the capsules. Nevertheless, the most widely distributed subspecies, *V. praemorsa* subsp. *major* (Hook.) Baker, subsp. *linguaefolia* (Nutt.) Baker, and subsp. *praemorsa* have naked capsules.

One also wonders how and when subsp. *shastensis* derived its characters. Examination of *V. praemorsa* subsp. *arida* Baker and subsp. *oregona* Baker & Clausen reveals the fact that they both possess the same pattern of sepal pubescence as does *V. Bakeri* subsp. *shastensis*. In addition, these two subspecies of *V. praemorsa* have more or less pubescence on their capsules. Although there is no known overlap at the present time in the distribution of *V. Bakeri* subsp. *shastensis* and these two Great Basin subspecies of *V. praemorsa,* it is known that an arm of the Great Basin Flora extends from southern Oregon southwest along the Klamath River into the Shasta and Scott valleys, and this lends credence to the belief that *V. praemorsa* subsp. *arida* will be found to occur somewhere in this area not far distant from where we collected *V. Bakeri* subsp. *shastensis*.

From bud fixations of subsp. *shastensis* made in the Scott Mountains, (*Baker 13133, 13139*) Dr. Jens Clausen and Dr. Malcolm Nobs of the Carnegie Institution of Washington at Stanford obtained a chromosome count of $2n = 48$, showing this taxon to be an octoploid. *Viola Bakeri* subsp. *Bakeri* and *V. praemorsa* subsp. *arida* and subsp. *oregona* are also octoploid, $2n = 48$. Therefore, it may be assumed that gene interchange could have taken place between these entities at some past time, thus possibly accounting for the pubescence of the sepals and capsules of *V. Bakeri* subsp. *shastensis*.

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